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Beyond the Overall Economic Downturn: Evidence on Sector-specific Effects of Violent Conflict from Indonesia

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Abstract

This paper analyses the impact of violent conflict on economic growth using micro-level data from Indonesia. We compile a panel dataset at district level for the period 2002-2008, and disentangle the overall negative economic effect of violent conflict into its sectoral components. Our results reveal substantial differences across sectors, with the most detrimental impact evident in manufacturing industries and the service sectors. Further, the short-run impacts on growth appear to be only temporal, and some evidence for the 'phoenix effect' in the early post-conflict period is found. The construction sector, in particular, recovers soon once conflict ends, while manufacturing industries and the finance sector appear especially reliant on a lasting peace. A series of alternative specifications confirm the main findings of the analysis.

Keywords: Violent Conflict, Economic Growth, Indonesia

JEL Codes: O11, F51

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INTRODUCTION

Indonesia, the largest and most populous Southeast Asian nation, emerged with a new democratic government following the 1998 fall of President Suharto. The collapse of Suharto's long and authoritarian New Order regime was followed by a wave of high-profile violence, with separatist conflicts in Aceh and East Timor, religious conflicts in Maluku and Sulawesi, and ethnic conflicts in Kalimantan and Nusa Tenggara Timur. One decade after the end of the New Order, some progress in restoring peace and political stability has been achieved and Indonesia is moving toward a more stable democratic government while the number of headline-making conflicts has sharply decreased.

This paper employs exceptionally detailed data sources to analyze the potentially varying effects of violent conflict on different areas of the Indonesian economy. While existing empirical evidence on the conflict-growth nexus mostly comes from cross-country studies and is based on aggregate GDP data, our approach allows going beyond the (well-known) overall negative impact of war. For this purpose, we combine district-level data on GDP composition with nationwide information on conflict occurrence in 2002, 2005, and 2008.

The panel analysis provides important insights into sector-specific vulnerabilities during violent conflict and in the early recovery phase. We find, first, that activities depending on capital and transactions are particularly affected by violent conflict. Second, conflict-related declines in economic growth are of temporary nature, with some areas of the economy recovering faster than others once conflict ends. Third, the results confirm that the scale of the economic downturn depends on the intensity and type of violence, rather than the mere existence of mostly non-violent or low intensity conflicts. Finally, spillover effects from violence in neighboring regions are less clear and appear to only affect transaction-intensive industries, most notably transport industries and financial services.

The paper is structured as follows. The next section reviews the existing literature on growth and violence, discusses potential transmission channels from violence to growth, and derives some hypotheses on the sector-specific impacts of violent conflict. We then provide background information to the conflicts under consideration, present the data, and discuss our estimation strategy. This is followed by some descriptive statistics and the presentation of the results from the regression analysis.

BACKGROUND

Growth Empirics

Explaining differences in economic growth and, more generally, in income levels across countries and over time is one of the most important, although one of the more difficult, tasks in economic research. The existing literature is vast and constantly amended by new contributions to both theory and empirics. Solow's 1956 model is still the major theoretical reference and basic workhorse of growth empirics. Based on a neoclassical production function, long-run per capita incomes in this model depend on savings and population growth rates as well as technological progress. Countries with similar characteristics in this respect are expected to converge to a common steady state, with only transitory income differences between these countries.

This neoclassical theory of convergence is challenged by real world divergent growth experiences. The permanent income differences between countries are attributed to structural and institutional heterogeneities with empirical work finding a wide range of economic, political, social and geographical factors that impact economic growth.[1] The validity of this large amount of work, however, with a variety of different and sometimes opposing results, is increasingly called into question. *Inter alia*, criticism includes arbitrary model specifications without theoretical underpinning, issues of data comparability, inappropriate econometric methodologies, limitations of cross-country analyses, and insufficient treatment of endogenous explanatory variables (see e.g. Bosworth and Collins, 2003). Some work tries to account for these shortcomings, with Durlauf et al. (2005) identifying a set of explanatory variables consistently found to be related to economic growth. While the focus of this study is on violent conflict rather than on the growth process as such, cross-country evidence on these factors is briefly reviewed.

Today, scholars widely agree on the importance of institutional settings for economic development. Acemoglu et al. (2004) stress the role of economic institutions, such as well-defined property rights and the presence of functioning markets for economic outcomes. The quality of both economic and political institutions, as well as the impact these have on economic growth, is assessed in a wide range of studies. Acemoglu et al. (2001), for instance, tackle concerns of endogeneity by using the mortality of colonial settlers as an instrument for

[1] Durlauf et al. (2005) report a total of 145 potential determinants of economic growth that are studied in the literature.

today's institutional quality and confirm a decisive impact on growth.

Besides historical legacies, ethnic diversity is often seen as another explanation for cross-country differences in the effectiveness of public policies. Heterogeneous preferences across ethnic groups are likely to impede agreement on policy decisions and result in lower spending on public goods (Alesina et al. 1999). Sound government policy thereby plays a particularly decisive role in the area of infrastructure. Efficient investment, for example in telecommunications, transport, water or energy systems, facilitates economic activity and is found to contribute substantially to GDP growth (Esfahani and Ramírez, 2003).

The relationship between education and economic growth is more contested. While a positive link between individual education and income is confirmed by a large body of microeconomic studies (see e.g. Psacharapoulos and Patrinos, 2004), cross-country evidence is mixed. Recent macro-level analyses on the impact of educational attainment on economic growth fail to establish a significant relationship (see Easterly and Levine (2001) for a discussion). Potential explanations include differences between social and private returns to education, measurement errors and limited data comparability.

Other country characteristics that are identified as fundamental growth determinants, such as climatic conditions (Masters and McMillan, 2001), geographic isolation (Frankel and Romer, 1999), or culture and religion (Barro and McCleary, 2003), are rather time-invariant and can barely be influenced, at least in the short term. In general, cross-country studies tend to focus on the factors that drive long term growth and rarely provide for short term interventions. A distinction between short term growth dynamics and long term equilibrium effects could therefore add valuable insights for policy makers (Rao and Corray, 2009).

Evidence from cross-country studies often also suffers from restrictive assumptions. Pooling across countries implicitly assumes a universal growth process and homogeneous growth parameters, i.e. identical underlying production functions and technological improvements. With most samples, however, consisting of very heterogeneous countries at different stages of development and with diverse economic structures, cross-country parameter estimates, at best, display inter-country averages, but tell little about the evolution of growth for individual countries (Bos et al., 2010).

Therefore, case studies using country specific time series or panel data are more appropriate for analyzing country specific growth experiences. Common institutional and legal frameworks plus the consistency of data sources within individual countries contribute to a higher comparability of growth processes. Disaggregated GDP data often enables

investigation into inter-industry differences. Empirical research in this field has focused, *inter alia*, on the determinants of growth rates in specific sectors, including, among others, Sapio and Thoma (2006) on US manufacturing, and Bosma, Stam and Schutjens (2010) on Dutch manufacturing and services; as well as the contribution of specific sectors to overall economic development, including Balaguer and Cantavella-Jordá (2002) on Spanish tourism.

Evidence from developing countries is relatively scarce. For Indonesia, Garcia and Soelistianingsih (1998) analyze the evolution of provincial incomes under the New Order regime and find that poorer provinces catch up, especially through investments in human capital. Using district-level data for the period 1993-2005, McCulloch and Sjahrir (2008) confirm the hypothesis of relative convergence and the positive growth impact of a better educated labor force. None of these studies accounts for the effects of violent conflict on the local economy.

Impact of Violent Conflict on Growth

Violent conflicts affect economic outcomes mainly through the destruction of human and physical capital, shifts in public spending and private investment, as well as the disruption of economic activities and social life (see Blattman and Miguel (2010) for a summary). The specific impacts depend on each conflict's singular characteristics: it is not just the type of conflict, but also its intensity, duration, and geographical spread that shapes its economic consequences. We also expect that violent conflicts affect individual economic sectors differently, given differing characteristics.

Quantitative evidence on the overall growth effect of conflicts mostly comes from cross-country datasets. Collier's (1999) analysis establishes a substantially negative link between civil war duration and economic growth. His approach, however, is criticized for not considering variations in the scale and scope of conflict. Imai and Weinstein (2000) stress the importance of the geographical spread of conflicts, and conclude that wide-spread civil wars affect economic growth five times more than conflicts fought in small parts of the country. Bodea and Elbadawi (2008) distinguish different levels of political violence and find particularly negative growth impacts for civil wars, relative to the less severe effects resulting from riots or coups. Consistent with this, Koubi (2005) finds that the impact that civil war has on long-run economic growth to be proportional to conflict severity in terms of conflict-related human losses.

Single country evidence on the growth impact of violence is relatively scarce. Abadie and Gardeazabal (2003) show a negative impact of the ETA terrorist conflict on economic growth in the Basque Country. Dependent on the intensity of terrorism, Basque per capita GDP declined, on average, by 10 percentage points relative to other Spanish regions. Lopez and Wodon (2005) use time series data to estimate the impact of the 1994 genocide on the evolution of Rwanda's per capita GDP. Based on outlier detection and correction, their results indicate a significant loss in GDP in the short term, though no impact is found on post-genocide growth rates. Arunatilake et al. (2001) assess the direct and indirect costs of the Sri Lankan civil war between 1983 and 1996, with their estimates of total costs adding up to twice the country's 1996 GDP.

Existing literature on Indonesian conflicts mostly deals with the socioeconomic determinants of violent conflict and not with its consequences (Tadjoedin and Murshed, 2007). Barron, Kaiser and Pradhan (2009) use the 2003 PODES village dataset to analyze correlations of local violent conflicts with several socioeconomic variables, including unemployment, inequality, and natural disasters. Anecdotal evidence reveals that the economic potential of conflict prone areas is not fully realized due to conflicts. Most production in these areas is disrupted and those who trying to export products face barriers such as illegal taxes or fees imposed by civil servants and military personnel (Mawardi, 2006).

Often, the economic impact of violent conflicts is not limited to the conflict area as the impact spills over to neighboring regions and countries. Refugee flows increase labor supply and reduce per capita incomes, trade flows are disrupted, government spending is diverted to non-productive security measures, and foreign direct investments might be shifted away from entire regions that are perceived as insecure. Murdoch and Sandler's (2002) analysis of spatial dispersion finds significant negative growth impacts of civil wars for contiguous neighbors, especially in the short term. Using different data and methodology, De Groot (2010) confirms the negative economic effects of violent conflict for direct neighbors, but finds positive spillovers for non-contiguous areas.

The overall negative effects of violent conflict on economic development are hence well documented and seem shaped by the conflict's type, duration, and geographical spread. However, our understanding of, and especially empirical evidence on, the transmission mechanisms from conflict to growth remain limited. In what follows, we characterize the drivers of the economic downturn in conflict-ridden societies and present the existing evidence on the varying effects of conflict across economic activities.

Transmission Channels from Conflict to Growth

First and foremost, the level and growth rate of the capital stock are negatively affected by conflict-related damage and reduced investment. The destruction or dislocation of production facilities and key infrastructure, most notably in the areas of transportation, communication and energy, impedes economic activity. Private agents become involved in dissaving and portfolio substitution as perceived risk increases and as investments in regions not affected by violent conflict offer higher relative returns with lower risk. Government spending on productive activities is likely to decrease due to an eroding tax base and hampered tax administration on the one hand, and the diversion of public funds to military and security expenditures on the other. Poor macroeconomic policy, with rising budget deficits and increasing inflation, tends to further hamper economic growth.

Empirical work mostly focuses on changes in public and private investment. Svensson (1998), for instance, identifies a potential channel from political instability and associated weak property rights to reduced private investment. A negative impact of political violence on private savings and domestic investments is also found by Fielding (2000, 2004) in his analyses of the macroeconomic impacts of the Israeli Intifada. Gupta et al. (2004) reveal adverse effects of armed conflict on tax revenues and public investments: higher government spending on defense is associated with macroeconomic instability and a diversion of resources away from socially and economically productive sectors. Knight et al. (1996) relate this growth-retarding impact of rising military expenditures to negative effects on capital formation and resource allocation. Finally, Imai and Weinstein (2000) conclude that reductions in private investments affect economic growth much more than downturns in public investment.

Assessing the growth impact of other conflict phenomena, such as the loss of human capital or changes in economic activities, is more difficult. People living in conflict zones face increased risks of being injured or killed. The better off (and better educated) are more likely to flee to neighboring regions or countries. In the longer term, human capital accumulation is affected by the destruction of educational infrastructure, the absence of teachers, and lower government spending on education during times of war. The negative long term consequences of civil wars for aggregate health and education measures are documented by an increasing

number of studies.[2]

In the short term, conflict-related deaths and injuries, emigration, displacement, and forced conscription reduce the available labor force and are likely to affect productivity. However, systematic empirical evidence on the impact of violent conflict on labor markets hardly exists. One exception is the assessment by Arunatilake et al. (2001) of the costs of the civil war in Sri Lanka. Their estimates of the costs related to displacement and lost human capital sum up to around five percent of the estimated total costs of war.

More is known about conflict-related distortions of economic behavior, i.e. impacts on economic activity and market exchange. Heightened insecurity, threatened property rights, and the suppression of civil liberties result in an unsafe business environment. Transaction costs increase, trust deteriorates, economic activities are disrupted and market exchange is limited in war-torn societies. Micro-level studies document people's retreat into less vulnerable economic activities in conflict regions. Deininger (2003), for example, shows that civil strife in Uganda during the 1990s reduced off-farm investments and led to a shift toward subsistence farming with less market integration. Similarly, Verpoorten (2009) finds that the Rwandan households most affected by violence were prevented from selling their cattle, the usual response to adverse income shocks, due to unsafe roads and the related inaccessibility of markets.

Further, violent conflict hampers not only domestic exchange, but international trade flows as well. Blomberg and Hess (2006) find that global trade flows are impeded to a greater extent by violent conflicts than by traditional tariff barriers. According to their estimates, bilateral trade flows for conflict-affected countries decline by up to 40 percent. The strongly negative impact of war on international trade is confirmed by Glick and Taylor's (2005) analysis covering 1870-1997.

Sector-specific Evidence and Expectations

Given the substantial and diverse effects of violent conflict, we expect varying degrees of vulnerability across different economic sectors. Economic activities that are strategically

[2] Ghobarah et al. (2003) examine the impact of civil wars on public health; Lai and Thyne's (2007) cross-country study finds devastating war effects on educational systems. Growing evidence on the human capital costs of violent conflict is also available at the micro-level; see Households in Conflict Network, http://www.hicn.org, for recent studies.

important to the belligerent parties might also become direct targets, such as relevant production facilities or the transportation and logistics sectors. Empirical evidence on these sector-specific effects of violent conflict is generally rare and comes mostly from single-sector case studies, as disaggregated growth measures from war-torn economies are often not available. Collier (1999) argues that those activities, which supply or are intensive in either capital or transactions, are particularly vulnerable. Sectors less dependent on capital and transactions should be relatively less affected, which applies to and is confirmed by the observed rise in subsistence agricultural activities in times of conflict.

The overall impact of conflict on primary sector growth, however, seems ambiguous. Destroyed assets, landmine contamination, as well as a shortage of labor and capital are likely to impede agricultural development. The production of (cash) crops and livestock requires future investments and is expected to decline due to shortened planning horizons for farmers. Dramatic losses of livestock are documented for several civil wars.[3] Teodosijević (2003) compares growth rates of agricultural production in 38 conflict-affected countries and finds substantially lower outcomes during violent conflict in comparison with the pre-war period.

Generally, concerns of endogenous economic outcomes with respect to violent conflict particularly apply to the primary sector. Being central to many societies in the developing world, environmental scarcities and food insecurities are among the main triggers of violent conflicts. Prospects for agricultural development might therefore be structurally lower in conflict-prone regions.

Similarly, the link between natural resource wealth and violent conflict is likely to run both ways. Scholars find that the production of oil and 'lootable resources', such as gemstones and drugs, to be associated with conflict incidence, specifically separatist conflicts (see Ross (2004) for a summary). Violent conflicts, in turn, tend to increase economic dependency on natural resources: while other sectors of the economy collapse, natural resources are immobile and represent an often important source of revenue for governments and/or rebels. Official growth rates of the mineral sector then depend on the legal status of the profiteer and the perceived legitimacy of extraction.

Turning to the industrial sector and applying Collier's (1999) concept of war vulnerability, we expect manufacturing and construction industries to be particularly affected. Manufacturing is

[3] Brück (1997) estimates a loss of 80% of the cattle stock in the Mozambican civil war. Similar devastation is found for Uganda (Annan, Blattman and Horton, 2006) and Rwanda (FAO, 1997).

often intensive in both physical and human capital, requires complex coordination with contractors and vendors, and is therefore especially reliant on the institutional environment. In his analysis of conflict-ridden developing countries, Depetris Chauvin and Rohner (2009) points to negative effects of war for exporting industries due to conflict-related trade barriers. The collapse of the domestic demand for investment goods, both from state and private agents, would also, and in particular, affect the construction sector.

The service sector, finally, encompasses a broad range of economic activities, ranging from traditional services – house cleaning, food services, barber shops, and the like – to trade, transport, tourism, the social sector, as well as finance and business services. Finance is expected to suffer from capital flight and falling demand for transactions, with the latter also applying to trade and transport industries. Likewise, tourism is particularly sensitive to violent events: Neumayer's (2004) cross-country analysis reveals strong negative impacts of political violence on tourist arrivals, with even stronger impacts in the long term compared to contemporaneous effects.

Increasing military expenditures during violent conflict involve shifts in government spending often to the detriment of social services. Traditional services tend to be location-specific and are less dependent on physical capital and long term investments. Assumed to be relatively invulnerable to war, such local services might nevertheless suffer from the overall economic decline. Generally, the lack of employment opportunities in conflict times often leads to an increase in informal businesses. These activities, such as petty trade, peddling work, or the selling of food are difficult to capture in official statistics.

One important issue omitted so far is the dynamic aspect of violent conflict, i.e. varying economic impacts at different stages of conflict. Disregarding conflict intensity, the negative shock related to the outbreak of violence might have a more detrimental growth impact than an ongoing conflict. Cerra and Saxena (2008), for instance, show that the initial economic decline in countries affected by civil war is substantial, but they expect at least partial recovery of output levels after a relatively short period of time. Contrary to the convergence predictions of neoclassical growth models, however, a complete catch-up to pre-war levels in the post-conflict period is not observed.

Building on the Phoenix factor theory (Organski and Kugler, 1977), which refers to the post-conflict restoration of economic activities, we still expect positive prospects for economic growth in the recovery process. Efforts of reconstruction, for instance, might spark a construction boom once violence and insecurity decline (Collier, 2009). Recovery of other

areas of the economy, such as the tourism industry or the financial sector, might be more reliant on the rebuilding of trust and a peaceful environment, which takes time.

CONFLICT AND DATA DESCRIPTION

Background to the Violence

Before turning to the data used to analyze the sector-specific effects of violent conflict in the early years of the post-Suharto era, we briefly characterize the most severe conflicts of that era. Most international attention is paid to the conflict between the *Free Aceh Movement* (GAM) rebels in Aceh and the Indonesian government (see Reid (2006) for an in-depth analysis of the conflict). This separatism fight began with GAM's declaration of an independent Aceh in 1976 and lasted for almost 30 years, with an estimated 12,000 killed during the conflict. As a province rich in oil and gas, with a long history of independence and a regional specific Muslim character, Acehnese aspirations for political autonomy were based on economic as well as historical and religious motivation. The New Order regime under Suharto responded to the secessionist movement with increasingly repressive measures, while at the same time taking a lion's share of the province's significant revenues from oil and gas.

The fall of Suharto in 1998 raised hope for an end to the conflict and peace talks between the democratically elected Indonesian Government and GAM were initiated with special autonomy status offered to the province. Concurrently, fighting between GAM rebels and the Indonesian military continued, and even intensified between 1999 and 2002, resulting in a large death toll, especially among civilians. In May 2003, when peace talks finally failed, the Indonesian government imposed martial law in Aceh and started a major military offensive to ultimately weaken the rebel movement.

Growing battle fatigue among GAM members combined with the newly elected President Yudhoyono's and Vice President Kalla's political will to end the conflict contributed to a tentative resumption of the peace process in late 2004. It was in this context that Aceh was hit by the devastating tsunami in late December 2004. It struck much of the western and northern coast of the province. Both belligerent sides agreed to cease hostilities in order to facilitate the recovery process, and the subsequent peace talks resulted in the Helsinki peace agreement in August 2005. Since then, Aceh has entered a period of relative peace.

The separatist movement in Aceh is not been the only post-Suharto conflict that Indonesia has dealt with. Suppressed by the New Order's military might, long-simmering tensions finally

broke out into overt conflict and destructive violence during the country's transition to democracy and decentralization. While conflicts occurred throughout the archipelago, some regions were particularly affected by violence.

In the provinces of Maluku and North Maluku, tensions between religious and migrant groups caused over 7,000 deaths between 1999 and 2002 (see Brown et al. (2005) for a conflict overview). Populated by Muslims and Christians in approximately equal proportion, historical inequalities stemmed from preferential treatment of Christians during Dutch colonialism. The political, social, and economic dominance of Christians, however, began to erode under the Islamization policies during the last decade of the New Order regime, when Muslims were increasingly appointed to key positions in the civil service. Continued influx of mostly Muslim migrants from Java and Sulawesi further challenged the fragile ethno-religious balance, and resulting tensions over communal land and resources were aggravated by the 1997 economic crisis.

In January 1999, a fight between an Ambonese Christian bus driver and an immigrant Muslim triggered a period of wide-spread inter-communal violence that quickly spread to other parts of the province. The initial disinterest, or even active involvement, of security forces contributed to an escalation of violence, and the conflict further intensified in mid-2000, when several thousand fighters of the newly-founded Islamic militia organization *Laksar Jihad* entered the region to support the Muslim cause. The central government's build-up of security forces along with Vice President Kalla's efforts to mediate peace resulted in the Malino II peace agreements in February 2002. While this peace is fragile and occasional violence continues, conflict is considerably less intense (Varshney et al., 2009).

Comparable patterns of violence evolved in Sulawesi, located to the west of the Maluku islands, and particularly in the province of Central Sulawesi. For similar reasons,[4] tensions between Christians and Muslims increased during the 1990s, gaving way to severe sectarian violence in the post-Suharto period, with an estimated 1,000 killed and 100,000 displaced (see e.g. Human Rights Watch (2002) for a conflict overview). With the absence of effective security forces and functioning legal institutions, the conflict went through different phases and intensified further with the arrival of *Laskar Jihad* fighters in mid-2001. The increased

[4] Similarities in the underlying causes of the violence in the Moluccas and in Central Sulawesi include historical socio-economic imbalances, shifts in local power from Christians to Muslims as a result of Suharto's 'Islamic Turn' in the 1990s, spontaneous and government-led in-migration of Muslims mainly from South Sulawesi and Java, as well economic uncertainty in the wake of the 1997 economic crisis.

presence of police and military personnel combined with the central government's efforts to mitigate the conflict finally led to the Malino peace declaration in December 2001. The number of communal clashes has since declined substantially; incidents of violence, however, still sporadically occur and peace remains vulnerable.

Conflicts reported outside these areas are spread across the archipelago, with more pronounced levels of violence in the Nusa Tenggara islands, parts of Java and Central Sumatra, as well as Papua. Underlying causes of these low intensity conflicts appear to be manifold and related to local circumstances (Barron et al., 2009). Generally, a lack of effective institutions and mechanisms of dispute resolution, local power struggles in the process of decentralization, and conflicts related to land ownership and usage seem to be the most prominent drivers of communal violence in Indonesia.

Growth Data

For the empirical analysis looking at the economic consequences of these conflicts, we draw on two distinct data sources. Data on economic growth is provided by the Central Bureau of Statistics, *Badan Pusat Statistik* (BPS). The Gross Regional Domestic Product (GRDP) data are disaggregated at district[5] and sectoral level. Table I in the Appendix provides an overview of the different sectors, sub-sectors, and sub-categories. We distinguish between the primary, secondary, and tertiary sector, as well as additionally disaggregating into the following nine sub-sectors: agriculture, mining, manufacturing, energy, construction, commerce, transport and communication, finance, and other services. For each category, we calculate the annual rate of GDP growth based on the reported value added. In order to control for economic spillover effects, we also calculate the average weighted growth rate in neighboring districts in the current and preceding year.[6] Apart from five missing observations,[7] a balanced panel is available.

It is important to note that the GDP figures are compiled separately by the BPS offices at national, regional, and district levels, which is likely to result in varying qualities of the data provided. Moreover, the BPS system does not guarantee that district and provincial figures

[5] As of 2008, Indonesia is divided into 33 provinces, which are further divided into a total of 456 districts.

[6] Districts are considered "neighboring" when sharing a common land border.

[7] Control variables are not available from the district of Nias (North Sumatra). GDP growth rates can not be calculated for the newly founded districts of *Kota Bengkulu* (Bengkulu) and *Kota Bau-Bau* (South East Sulawesi) for 2002, as GDP data for 2001 is not available.

add up to provincial and national aggregates, respectively. Indeed, the sum of district GRDP deviates, on average, by around three percent from the published provincial GRDP, with the sum of district GRDP equaling 99 percent of the summed provincial GRDP figures. As these deviations appear random across both regions affected and not affected by conflict, these weaknesses in the data are unlikely to bias the analysis.

Still, in order to reduce noise in the data, we correct a few observations where the reported production values deviate extremely from the overall trend. As these extreme growth rates are distributed randomly across districts and sectors,[8] correction of extreme sub-sectoral growth rates should not involve systematic distortions of the data. We adjust "outliers" (growth rates larger than 50 percent) in the following way: a) in cases where the current GDP value deviates extremely from the general trend, the average annual growth rate from the previous two years is used; b) *sub*-sectors with growth rates greater than 50 percent are excluded from the calculation of sectoral (agriculture, industry, services) and overall growth rates. This procedure results in the adjustment of 99 sub-sectoral growth rates in total, which corresponds to less than one percent of the whole sample. Table 1a provides descriptive statistics for the variables of economic growth. For robustness, we also run the analysis with the original data.

PODES Data

Control and conflict variables are derived from the Village Potential Statistics Survey (*Potensi Desa* or PODES), a village-level census that is conducted three times per decade. Also administered by BPS, PODES collects socio-economic information from all 69,000 Indonesian rural villages and urban neighborhoods. The survey is based on responses of the village heads and includes a wide range of indicators, ranging from population characteristics to infrastructure, economic activities, and social life.

We use three sequential rounds of PODES (2003, 2006, 2008), collected in August 2002, in April 2005, and between April and May 2008, respectively, and aggregate the data at district level, which is the administrative level for which economic growth data is available. A challenge in constructing the database arises from Indonesia's post-Suharto decentralization legislation and the related formation of new districts. This process, known as *pemekaran*, led to an increase in the number of districts, going from 376 in 2002, to 438 in 2005, and 465 in

[8] For example, a district with very high reported growth in the transport sector shows moderate growth rates in all other sectors.

2008. We therefore realign the 2005 and 2008 data to match the 2002 district borders in order to achieve a uniform dataset of 376 districts throughout.

While some of the standard controls in cross-country growth regressions are not available at district level,[9] the detailed village-level information provided by the PODES data allows us to obtain a valid set of proxy variables. We use the share of villages with electricity and the average educational attainment of village heads in a district to proxy for infrastructure development and institutional quality, respectively. Further explanatory variables are the rate of population growth, ethnic diversity, and natural disaster events. To control for the devastating impact of the 2004 Indian Ocean tsunami that hit the northern parts of Sumatra, we also include an indicator of tsunami-related physical destruction (UNORC, 2005). Basic descriptive statistics for the control variables are presented in Table 1b.

In 2003 PODES, a section on conflict has been included for the first time. The village heads report, *inter alia*, on incidences of conflict in the previous year, the number of conflict fatalities, the amount of conflict-related material damage, and whether the conflict is resolved or is still ongoing. Based on this information, a series of conflict variables at district level is derived. In order to obtain comparable indicators of conflict intensity, fatalities and material damage are set in proportion to the district's total population and total GDP, respectively. Conflict spillover variables are computed by the ratio of the total number of fatalities (total amount of material damage) in all neighboring districts to the total population (total GDP) of all neighboring districts. Unlike binary indicators used in related cross-country analyses, this approach allows for the consideration of the economic impact of conflict *intensity* in neighboring regions.

Furthermore, we aim to address potentially varying growth effects in different phases of violent conflict. However, as the PODES data covers conflict in the respective previous year and is conducted three times per decade, the information on the occurrence of violent conflict is not continuous. Although this prevents us from understanding the whole course of the conflict, village heads do indicate whether conflict is resolved or still ongoing. This information allows us to distinguish between active conflicts and observations from an early post-conflict situation, and we split the indicators of relative conflict intensity accordingly.

[9] For instance, no measure of human capital is included, as data on literacy or school enrolment rates are not available for 2008. Given the relatively short time period covered by the analysis, we generally do not expect these indicators to change substantially. In fact, the variance decomposition of available literacy data from 2000 to 2006 reveals low within district variations when compared to variation across districts.

Table 1c provides descriptive statistics for all conflict variables that we use in the analysis.

One concern we face is the issue of data reliability. Comparably low levels of conflict reported by PODES raise concerns of misreporting by local authorities. When conflict is perceived as the failure of local leaders and when respondents have doubts about the purpose of the survey, violence might not be accurately reported. Comparisons with other quantitative surveys and qualitative fieldwork indeed suggest that conflict is significantly underreported by PODES.[10] However, these comparisons also show such underreporting to be of similar magnitude across different regions and hence systemic, i.e. not biased by local characteristics. PODES data is therefore assumed to provide accurate information on *relative* levels of conflict both across districts and over time. Keeping in mind that the potential underreporting would result in an attenuation bias, we expect rather conservative estimates of the economic impact of violent conflict.

ECONOMETRIC APPROACH

Building on standard growth regressions, the starting point of our empirical analysis is the following equation:

$$g_{it} = C_{it}\alpha + X_{it}\beta + \varepsilon_{it} \quad , (1)$$

where g_{it} is the total or sectoral growth rate of real GDP in district i and year t, C_{it} are measures of conflict, X_{it} is a matrix of other covariates that determine economic growth, and ε_{it} is the unobservable error term. The coefficient of interest is α, which captures the effects of conflict on GDP growth. Previous macro-level studies on the economic impacts of violent conflict have in large part relied on pooled OLS estimation (Bozzoli et al., 2008). In this setting, however, the underlying assumption of independent and identically distributed errors ε is likely to be violated.

When factors that affect a society's economic outcomes and its vulnerability to violent conflict at the same time are omitted, OLS estimates are inconsistent. Cultural attitudes, for instance, are hard to measure, but potentially drive both growth and conflicts. Given the panel structure of the data, one way to deal with such unobserved heterogeneity is the introduction of district fixed effects (FE) to control for those district characteristics that did not change

[10] Barron and Sharpe (2008) monitor conflicts reported in local newspapers in the provinces of East Java and Nusa Tenggara Timur (NTT) during the period 2001-2003; Barron et al. (2004) conduct village-level case studies in the same provinces for comparison with 2003 PODES.

over the 2002-2008 period. This captures the underlying cultural values, as well as other time-invariant or long term, slow changing, growth determinants, such as initial wealth or geographic and climatic conditions.

The inclusion of time dummies further accounts for overall macroeconomic trends that affect all districts alike. Therefore, only additional explanatory variables that vary both with district and over time need to be included for the analysis of short term and within-district growth dynamics. The variance decomposition for both the growth and conflict variables reveals larger variations over time (within variation) than across districts (between variation), which confirms the accuracy and necessity of the FE model, in particular, for our focus on the role of violent conflicts.

As every empirical investigation of the conflict-growth nexus, we face concerns of reverse causality. That is, (low) economic growth is not only a result, but also a potential cause of violent conflict, leading to inconsistent parameter estimates. Ideally, we would like to instrument for the endogenous variable(s) to disentangle simultaneous causation. Finding suitable "instruments", however, which predict the incidence or even intensity of violent conflict and are uncorrelated with the error term, is extremely difficult. Instruments for conflict proposed by the literature include agricultural growth, urban population, and tropical location (Kang and Meernik, 2005). Further, the size of the population and the geophysical environment may considered as potential IV candidates.[11]

All of these instruments seem neither valid nor relevant. While the required exogeneity with respect to economic growth is disputable, its explanatory power in predicting violence appears even more problematic. The outbreak and the course of violent conflict is, in general, highly complex, and attempting to capture these processes with only one or a few proxy variables inevitably runs the risk of oversimplification and misframing.[12] As convincing instruments are hardly imaginable, we forego the IV approach, and investigate potential reverse causality from growth to conflict for the Indonesian context in more detail.

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[11] Collier and Hoeffler (2004) find population size to be an important determinant of war, with more populous countries being more prone to conflict. Fearon and Laitin (2003) stress that mountainous terrain (similar: forest coverage) can facilitate civil wars, as rough terrain provides sanctuary to rebels.

[12] Potential reverse effects from growth to conflict are likewise contested. In an innovative approach, Miguel et al. (2004) use abrupt declines in rainfall in Sub-Saharan Africa, where economies primarily rely on rain-fed agriculture, to instrument for economic growth. While they find a negative impact of economic growth on conflict incidence, this result, however, seems not to hold when a more appropriate sub-sample of states with conflict on their own territory is used – as opposed to the inclusion of states that send troops to conflicts in other states (Jensen and Gleditsch, 2009).

The underlying reasons for the conflicts in Indonesia at the turn of the millennium are multifarious and even vary across the affected regions. While the conflict in Aceh was driven by the long quest for (more) independence, the widespread communal violence rose from latent tensions related to horizontal inequalities and large-scale migration, the lack of effective security and justice institutions, and local-level struggles for economic power in the process of decentralization. Economic uncertainties in the wake of the financial crisis certainly contributed to the 1999 outbreak of violence, and disappointing economic developments thereafter are likely to have affected people's decision to engage in conflict.

However, focusing on the 2002 PODES wave, GDP growth seems not to be among the most obvious drivers of reported violence: first, the conflicts reported by the village heads represent the September 2001 to August 2002 period. The analysis therefore captures the impact of conflict on slightly lagged growth. This is especially true for Central Sulawesi and the Maluku islands, where increased levels of conflict in 2001 were followed by the Malino peace agreements signed in December 2001 and February 2002, respectively.

Second, current economic growth is unlikely to have significantly influenced the intensity of violence in the case of these mostly ongoing conflicts. Rather, high levels of violence in Aceh between 1999 and 2002 were related to a brutalization of the conflict aimed at influencing the outcomes of the negotiations on autonomy. Intensified clashes between the Indonesian military and the GAM were increasingly accompanied by atrocities against civilians. Similarly, provocations by the military and the massive arrival of non-local *Laskar Jihad* fighters fueled the intensification of the conflicts in the Maluku islands and Central Sulawesi.

Hence, conflict intensity and frequency were mainly driven by outside interventions, rather than by short-term evolutions of the local economy. While being aware of potential distortions due to reverse causality and not claiming conflict to be exogenous to growth, we believe that causation in this setting strongly runs from conflict to growth, rather than the opposite way. The estimates from the fixed effects regressions are therefore assumed to reflect the growth impact of violent conflict in a fairly accurate way.

EMPIRICAL RESULTS

Descriptive Statistics

Figure 1 displays the evolution of sectoral and overall GDP growth rates in Indonesia for the 2001-2008 period. Overall, weighted annual growth appears relatively stable at around five

percent and increases slightly over time. The service sector, which accounts for 45 percent of total GDP in 2008 (see Table I in the Appendix for the sectoral shares of total GDP in 2000 and 2008), is the main driver of the Indonesian economy with average annual growth rates above six percent. Above-average growth rates are also found in the industrial sector, with manufacturing being the most important sub-sector and accounting for one quarter of total GDP. Relatively low growth is observed for the primary sector. It still accounts for 26 percent of total rural production in 2008, with its share only decreasing slowly since 2000.

Table 2 summarizes the occurrence of conflict over time, as reported by village heads. We observe a substantial decrease in both the spread and the intensity of violence in 2005 and 2008, in comparison with 2002.[13] While 7.2 percent of all villages and neighborhoods report conflict in 2002, this figure is halved in 2005 and 2008. Even more striking is the decline in conflict-related human losses and physical destruction over time: fatalities and material damage in 2005 and 2008 each amount to only approximately one tenth of the 2002 figures, which documents Indonesia's move toward peace in recent years.

With most of the violence in 2002, we take a closer look at the spatial distribution of violence in this year. Figure 2a maps conflict in terms of fatalities per capita, Figure 2b shows conflict intensities in terms of material damage relative to district GDP. Conflict-related fatalities are relatively concentrated and particularly prevalent in the entire province of Aceh, as well as on the islands of Maluku, North Maluku, and Sulawesi. High levels of physical destruction are, in addition, observed in the province of Jambi and on the islands of Nusa Tenggara, while almost no material damage is reported from the western coast of Aceh.

Table 3 lists the districts in the sample which are most affected by violence, with observations almost exclusively from 2002 and from rural areas. In fact, only ten percent of overall fatalities and seven percent of overall material damage are reported from urban districts, which make up for around 20 percent of the total population in 2002. The figures also confirm the differences in the distribution of human losses and destroyed physical capital: a substantial share of those districts with high numbers of fatalities are comparatively little affected in terms of physical destruction, and vice versa (correlation between reported material destruction and fatalities: 0.66). We use this variation to analyze potentially varied economic impacts of different forms of violence.

[13] Village heads were asked for incidents of conflict in the previous year, which hence relates to conflicts in the periods September 2001-August 2002, June 2004-May 2005, and May/June 2007-April/May 2008. For simplicity, we refer to conflicts in 2002, 2005, and 2008, respectively.

In 2002, the main conflicts in Aceh, Maluku, and Sulawesi account for 89 percent of total fatalities (per capita) and 67 percent of total material damage (relative to the district's GDP) reported by village heads. Outside these regions, mostly low intensity forms of violence are reported from various parts of the country. However, it has to be noted that the majority of districts were hardly affected by any conflict, even in 2002, when 81 percent of the districts reported less than five conflict-related fatalities.

Regression Results

Table 4 presents the FE regression results for the main sectors. The dependent variable is the annual growth rate of district GDP. We run separate regressions for agriculture, industry, service, and total GDP growth. Some of the control variables are not significant. Unlike previous cross-country studies, we fail to find significant impacts of population growth, ethnic diversity, or infrastructure development (here: availability of electricity) on economic growth. A short survey period, the inclusion of district fixed effects, and the relative invariability of the variables in the short term are most likely explanations. A significantly positive impact on industry and overall growth is found for average educational attainment of village heads, which is supposed to measure improvements in the quality of institutions.

The two indicators of natural disasters yield mixed results. While the incidence of any kind of disaster (earthquake, landslide, and flood) in the years prior to the survey has no significant effect,[14] the impact of the 2004 tsunami on subsequent economic growth in the affected regions is substantially negative, and particularly so for agriculture. No spillover effects from current and recent economic growth in a district's vicinity are found, and time dummies confirm overall greater economic growth in 2005 and 2008, in comparison to 2002.

We include three indicators of violent conflict: the amount of material damage relative to total district GDP, the number of fatalities relative to district population size, and an indicator of conflict intensity in neighboring districts.[15] Results indicate a substantial and significantly negative impact of conflict-related physical destruction on industry, service, and total GDP growth. These estimates translate into an approximate 11 percentage points decrease in industrial growth, and a 5 percent age points decrease in service sector growth for the two

[14] The lack of significance is likely to be caused by the long, three-year period under consideration, the relatively frequent occurrence of floods in Indonesia, and missing information on the scale of destruction.

[15] Here, the conflict spillover variable is based on relative material damage in neighboring districts. An indicator based on the number of fatalities is used in later regressions.

most affected districts of Aceh Timur and Poso (Central Sulawesi). A district affected by the average 2002 conflict intensity would, accordingly, expect a decrease in growth by 0.2 (industry) and 0.1 (services) percent age points, respectively.

The conflict coefficients for agriculture are small in magnitude and insignificant, which seems to confirm the primary sector's relative immunity to violent conflict. So far, we do not find any spillover effects from conflicts in neighboring districts on domestic growth. Likewise, the coefficients for conflict fatalities are not significant, with the marginal exception of the service sector. Keeping potential multicollinearity among the conflict variables in mind,[16] this points to a more detrimental economic impact of physical destruction, compared to human losses. Before having a closer look into these varied effects for different forms of violence, we turn to the sub-sector regression results to investigate the particular economic effects of violent conflict in more detail.

Table 5 presents similar growth regressions for eight sub-categories of the industry and service sectors. The agricultural sector is omitted here, as no further disaggregation is available. While the same set of control variables as before are used, we focus on the growth effects of conflict-related material damage and drop the simultaneous inclusion of the insignificant fatality indicator. Some of the previously insignificant control variables now become significant for specific branches, such as infrastructural development for finance, transport, and communication growth. Natural disasters have particular impact on the industrial sector, while services seem less severely affected. Neither economic growth nor conflicts in neighboring districts significantly influence domestic outcomes.

The conflict coefficients confirm our expectations and existing empirical evidence from previous sector-specific analyses. We find particularly strong negative conflict effects for financial services, transport/communication branches, and manufacturing industries. Substantial and significantly negative coefficients are also reported for construction industries and the commerce sector, which includes retail, hotels, and restaurants. The mining and energy sectors, i.e. electricity, gas, and water supply, appear unaffected. The only sub-category of the tertiary sector with an insignificant conflict coefficient is the area of 'services'. As government expenditures for administration and defense constitute the bulk of this category, maintained or increased security spending might be a potential driver behind this result.

[16] The Variance Inflation Factor (VIF), a simple measure to identify multicollinearity, is calculated and the results (VIF<2 for all explanatory variables) mitigate concerns of multicollinearity.

In the next step, we exploit some of the growth dynamics of violent conflict. *Ceteris paribus*, we split the indicator of relative physical destruction into ongoing and recently resolved conflicts. Table 6 presents the results from separate regressions on total, sectoral, and sub-sectoral GDP growth. As the general regression setup has not changed, the estimates for the control variables resemble those obtained in previous regressions and are therefore not discussed further here.

Focusing on the estimated growth effects of ongoing and recent conflicts, we find clear-cut differences. For most sectors, results point to a considerably stronger decline in growth rates during ongoing conflicts than indicated by the singular indicator of conflict previously used. In particular, the construction and transport/communication sectors seem to suffer most during episodes of violence. Collapsing demand for buildings and infrastructure combined with an overall decrease in business transactions potentially deepens the crisis in these sectors during times of conflict. A relatively strong negative growth impact of conflict is also found for manufacturing and commerce industries, which is in line with both Collier's (1999) concept of war vulnerability and existing evidence on the effects of violence on tourism and hospitality industries.

Turning to the growth impact for resolved conflicts, the estimates are by far less substantial and significant. The only exception is the services sub-category: including, *inter alia*, government defense expenditures, this is possibly related to a post-conflict cutback in public spending on security. Marginally negative impacts of resolved conflicts are still found for the financial sector and manufacturing, which are assumed to be particularly dependent on a stable market environment. By contrast, the even insignificantly positive 'post-war' coefficients for construction and transport/communication industries seem related to public and private investment in reconstruction activities.

Robustness Tests

A series of alternative sub-samples and conflict coefficients are employed to test the robustness of our findings. As the regression set-up and the control variables remain unchanged, we only present the estimates for the conflict coefficients in what follows.[17]

First, the sample is restricted to rural areas, where, by far, most of the violence took place.

[17] The complete set of regression results is available from the authors upon request.

The results, presented in Table 7a, are close to those for the whole sample: growth rates in the fields of transport/communication, construction, finance, and manufacturing are substantially affected during ongoing conflict. We find a marginally negative impact on commerce growth, while the positive post-conflict trend for the construction sector is strengthened. In addition, the results indicate negative conflict spillover effects on finance and transport/communication. While the transport sector relies, almost by definition, on cross-district activities, these results also suggest that trust and transactions in domestic financial markets are affected by neighboring conflicts.

Second, we exclude observations from the province of Aceh, to see to what extent our findings are driven by the separatist conflict in this region (Table 7b). Once Aceh is excluded, the negative effects of conflict on the tertiary sector turns become less significant and are partly absorbed by the conflict spillover variables. The magnitude of the conflict coefficients, however, remains largely unchanged. Interestingly enough, the immediate recovery of the construction sector after the end of conflict is strongly supported here. This effect becomes even clearer when we instead exclude the islands of Maluku and Sulawesi and the associated ethno-communal conflicts (Table 7c). In line with the Collier's (2009) characterization of the recovery process, we find the immediate post-conflict recovery efforts to center on the reconstruction of critical infrastructure. This trend is also supported by the substantially positive post-conflict growth estimate for the energy sector.

Third, instead of conflict-related material damage, we use alternative indicators of conflict. Table 7d presents the estimates for the indicators of conflict fatalities. Interestingly enough, the distinction between ongoing and resolved conflicts reveal substantial and significantly negative effects of human losses for ongoing conflicts. Consistent with previous findings for conflict-related material damage, finance, transport/communication, construction, and manufacturing are the most negatively affected. The results for resolved conflicts further confirm the impression of distinctly different economic impacts at different stages of violent conflict.

A second alternative indicator of conflict is the proportion of villages in a district that report incidences of conflict. Consistently, the coefficients are highly insignificant (Table 7e). As this indicator does not take into account the severity of violence, the mere existence of conflict seems to have no *a priori* impact on the economy. As claimed by related cross-country studies, the intensity of conflict decisively determines the impact on the economy. This is also confirmed when using absolute numbers of material damage and fatalities instead

of relative indicators of physical destruction and human losses (Tables 7f and 7g). The results are largely in line with our previous findings and underscore the particular conflict vulnerability of the service sector.

Finally, we repeat the main regressions with the original GDP data, without correcting for outliers in sub-sectoral growth rates. Results for the whole sample and the sub-sample of rural areas are presented in Table II.a and II.b of the Appendix, and confirm our main findings. Again, we repeat the analysis with the indicator of conflict fatalities (Table II.c in the Appendix) and obtain similar results.

CONCLUSION

The overall negative effect of violent conflict on economic outcomes is confirmed by a growing amount of literature. However, relatively little is known on sector-specific impacts of violence, as disaggregated GDP data is scarcely available from conflict-ridden countries. In this paper, we build on detailed, district-level, GDP data from Indonesia and on nationwide data on the occurrence of conflicts, which allows us to provide quantitative evidence on the vulnerability to conflict across different economic activities.

We find significantly different effects of violent conflict across sectors. As proposed by Collier (1999), industries dependent on either capital or transaction are most vulnerable to conflict. In particular, this applies to manufacturing, finance, transport and communication, as well as the retail and hospitality industries. The construction sector suffers substantially during active conflicts, while a slightly positive trend is found in the early post-conflict period. Other sectors' recovery appears less rapid; both manufacturing industries and the finance sector seem especially reliant on a lasting peace.

As we do not control for saving rates, reduced investment is a potential driver of the economic downturn in times of conflict. Overall, the analysis points to only temporary, short term impact of violent conflict on economic growth. A limitation of this study is the intermittent character of the conflict data. Observations on conflict before and after the respective survey years are not available, which prevents us from conducting a more detailed analysis of the growth dynamics during conflict and in post-conflict times. Nevertheless, the findings point to substantial differences in the sector-specific impacts of violent conflict, with potentially important implications for the reconstruction process and future development.

The state's and other actors' efforts to foster economic recovery in the post-conflict period

should be selective in the sense that they particularly target the most affected branches. The rebuilding of infrastructure, such as transportation and communication networks, seems crucial especially for manufacturing industries and logistics services. Further, restoring peace and security probably contributes most to the recovery of the financial and tourism sectors. Given the scarcity of public funds in the aftermath of conflict, consideration of the local economy's structure and the varying needs across branches should guide and contribute to an efficient use of resources.

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Table 1: Summary Statistics

	Variable	n	Mean	Std. Dev.	Min	Max
a. *Economic Growth*	District GDP growth: Agriculture	1120	3.45	4.55	-40.49	37.33
	District GDP growth: Mining	1036	4.76	8.10	-48.49	48.32
	District GDP growth: Manufacturing	1118	4.42	5.09	-48.62	48.36
	District GDP growth: Energy	1115	6.70	7.32	-48.48	47.70
	District GDP growth: Construction	1115	6.69	6.55	-40.68	47.95
	District GDP growth: Industry	1123	4.78	5.21	-37.51	42.39
	District GDP growth: Commerce	1121	6.04	4.57	-43.13	43.54
	District GDP growth: Transport and Communication	1117	6.85	5.10	-27.69	46.59
	District GDP growth: Finance	1104	6.86	6.80	-40.48	46.72
	District GDP growth: Services (sub-category)	1110	5.66	4.85	-49.33	45.22
	District GDP growth: Services	1123	6.06	3.69	-41.56	34.81
	District GDP growth: Total	1123	4.75	3.45	-33.57	35.91
	Spillovers: weighted* average agricultural growth	1123	3.65	2.20	-14.95	11.13
	Spillovers: weighted average industrial growth	1123	4.13	4.30	-31.47	31.57
	Spillovers: weighted average service sector growth	1123	5.84	2.68	-21.43	17.95
	Spillovers: weighted average total GDP growth	1123	4.23	2.74	-26.23	21.97
b. *Controls*	Share of villages where electricity is available	1123	94.78	13.07	0.74	100
	Average level of education of village heads (1-6)	1123	4.30	0.71	1.45	6
	Population growth rate	1123	2.00	2.32	-4.83	14.77
	Share of villages with more than one ethnicity	1123	72.74	23.39	2.42	100
	Natural disaster in the last three years	1123	0.376	0.238	0	1
	Tsunami: number of new houses required (per 1,000 Inh.)	1123	0.046	0.614	0	13.66
c. *Conflict*	Share of villages affected by conflict	1123	0.044	0.062	0	0.72
	Share of villages affected by violent conflict**	1123	0.029	0.040	0	0.38
	Fatalities per 1,000 inhabitants	1123	0.015	0.138	0	2.86
	Fatalities per 1,000 inhabitants (resolved conflicts)	1123	0.008	0.080	0	1.92
	Fatalities per 1,000 inhabitants (ongoing conflicts)	1123	0.007	0.095	0	2.78
	Material damage as .01 %-share of GDP	1123	0.050	0.342	0	6.98
	Material damage as .01 %-share of GDP (resolved conflicts)	1123	0.031	0.201	0	5.19
	Material damage as .01 %-share of GDP (ongoing conflicts)	1123	0.019	0.225	0	6.64
	Spillovers: fatalities per 1,000 inhabitants	1123	0.017	0.109	0	1.97
	Spillovers: material damage as .01 %-share of GDP	1123	0.041	0.224	0	4.93

* The average neighboring growth rate *ng* for sector *s* in district *i* is equal to the sum of the growth rates $g_{n,s}$ in the neighboring districts n=1,…,m_i, weighted by the neighbor's economic size $GDP_{n,s}$ relative to the economic size of all the m_i surrounding districts:

$$ng_{i,s} = \sum_{n=1}^{m_i} \left(g_{n,s} \times \frac{GDP_{n,s}}{\sum_{n=1}^{m_i} GDP_{n,s}} \right)$$

** Violent conflict is defined as conflict that involves either human or physical losses.

Table 2: Violent Conflict – Descriptive Statistics

CONFLICT INDICES	2002	2005	2008
Total			
Share of villages affected by conflict (%)	7.2	2.7	3.2
Share of villages affected by violent conflict (%)	4.4	2.1	2.3
Number of fatalities	4,858	276	335
Material damage (million of Rupiah)	740,560	97,742	8,476
District Means			
Number of fatalities	13.0	0.7	0.9
Material damage (million of Rupiah)	2,054	260	23
Fatalities per 1,000 inhabitants	0.042	0.002	0.002
Material damage as .01 %-share of GDP	0.132	0.016	0.002

Table 3: Districts most affected by violence

(A)	Province	District	Fatalities per Capita	(B)	Province	District	Mat. Damage (Share GDP)
(1)	NAD	Aceh Timur	2.86	(1)	NAD	Aceh Timur	6.98
(8)	NAD	Aceh Tengah	2.08	(4)	Sulawesi Tengah	Poso	6.65
(22)	Maluku Utara	Halmahera Barat	1.97	(16)	Maluku	Pulau Buru	3.99
(2)	Sulawesi Tengah	Poso	1.39	(11)	NAD	*Kota Langsa*	1.51
(91)	Maluku	*Kota Ambon*	1.24	(244)	Jambi	Kerinci	1.48
(71)	NAD	Aceh Selatan	0.77	(47)	Sulawesi Selatan	Mamuju	1.25
(15)	NAD	Aceh Barat Daya	0.63	(220)	Jambi	Merangin	1.24
(249)	NAD	Aceh Besar	0.34	(2)	NAD	Aceh Tengah	1.21
(12)	NTT	Rote Ndao	0.30	(29)	NTB	Dompu	1.13
(95)	NAD	Aceh Utara	0.26	(44)	Maluku	Maluku Tenggara	1.07
(4)	NAD	*Kota Langsa*	0.25	(411)	Sulawesi Selatan	*Kota Palopo*	1.07
(346)	NAD	Nagan Raya	0.22	(9)	NTT	Rote Ndao	1.02
(346)	NAD	Aceh Barat	0.20	(411)	Jambi	Bungo	1.01
(47)	Kalimantan Tengah	Kotawaringin Barat	0.18	(21)	NAD	Pidie	1.01
(346)	Papua	Puncak Jaya	0.17	(7)	NAD	Aceh Barat Daya	1.00
(3)	Maluku	Pulau Buru	0.17	(98)	Maluku	Maluku Tengah	0.96
(32)	Maluku	Maluku Tengah	0.16	(23)	Sulawesi Selatan	Luwu	0.88
(234)	NAD	*Kota Lhokseumawe*	0.15	(64)	NAD	Aceh Tamiang	0.84
(80)	NAD	Bireuen	0.13	(343)	NTB	Lombok Tengah	0.81
(103)	NAD	Aceh Singkil	0.12	(47)	Sulawesi Tenggara	Muna	0.75

Fatalities: conflict-related fatalities per 1,000 inhabitants. Material damage as .01%-Share of Total District GDP.
All observations from 2002 (observations from 2005 underlined). *Urban districts in italic*.
In parentheses: 'rank' of the district in terms of material damage (A) and fatalities (B), respectively.

Figure 1: Growth Trends 2001 - 2008

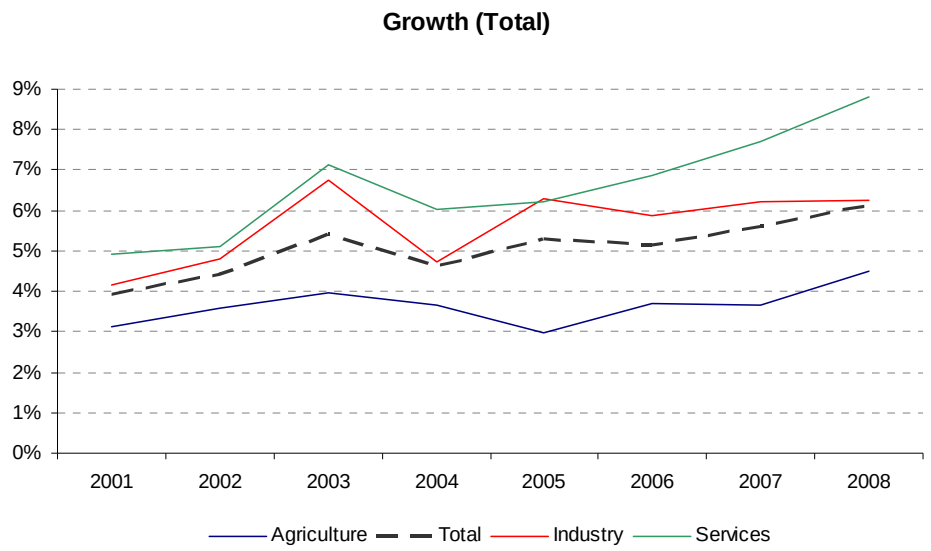
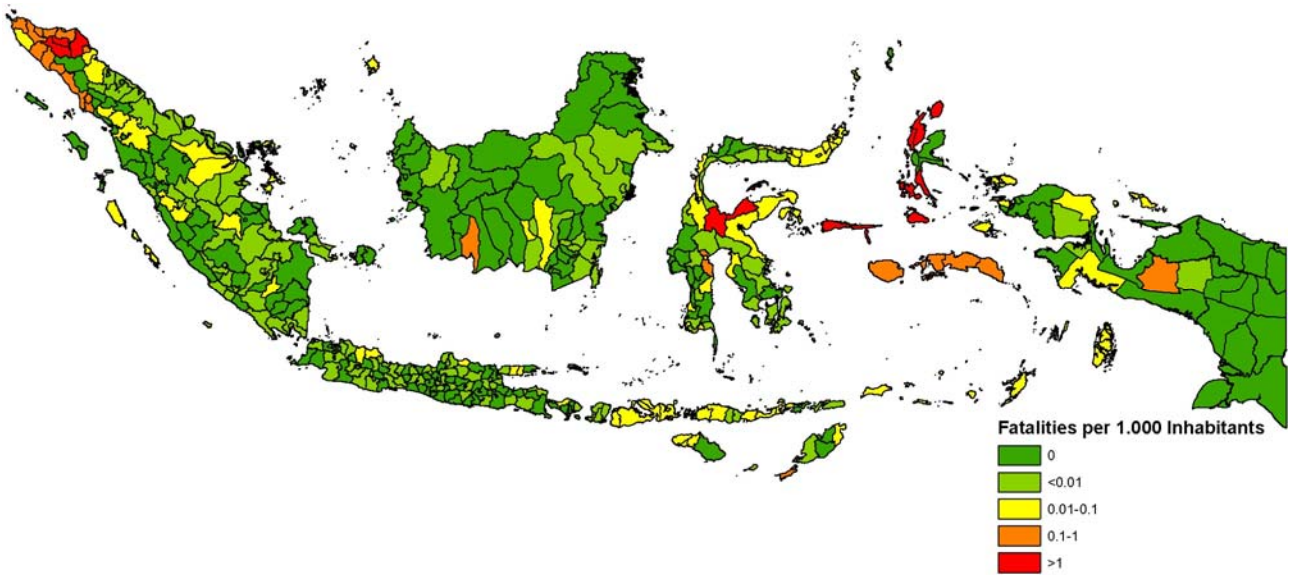


Figure 2: Distribution of Violence in 2002 [intended for color reproduction on the web and in print]

a) Fatalities per Capita



b) Material Damage (as Share of Total District GDP)

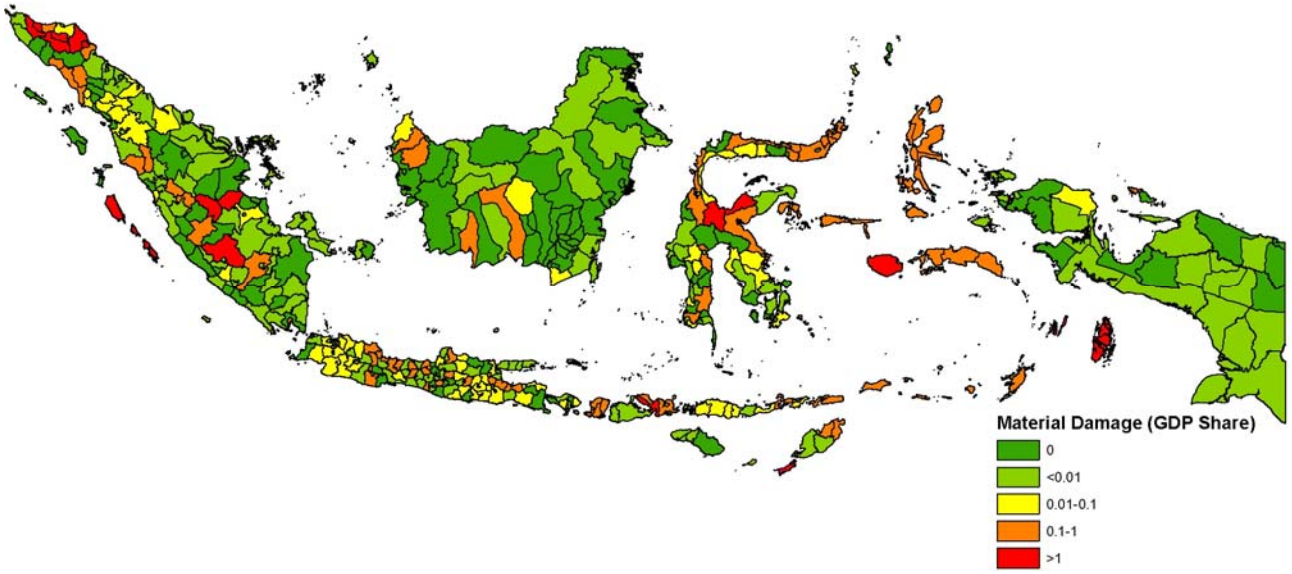


Table 4: Base FE Regression Results

Dependent Variable: ***GDP Growth***	**(1)**	**(2)**	**(3)**	**(4)**
	Agricult.	*Industry*	*Services*	*Total*
Population Growth Rate	0.06	0.01	-0.05	-0.08
	(0.08)	(0.09)	(0.06)	(0.07)
Availability of Electricity	-0.05	0.11	0.08	0.05
	(0.05)	(0.07)	(0.05)	(0.05)
Av. Education of Village Heads	0.84	1.44**	-0.06	0.83**
	(0.69)	(0.59)	(0.35)	(0.36)
Ethnic Diversity	0.03*	0.01	0.00	0.01
	(0.01)	(0.02)	(0.01)	(0.01)
Natural Disaster Occurred	0.83	-0.69	-0.19	0.31
	(0.65)	(0.87)	(0.65)	(0.44)
Tsunami: Physical Destruction	-2.93***	-1.45*	-0.61	-1.52***
	(0.58)	(0.75)	(0.48)	(0.47)
Average Neighboring Growth: Total GDP	-0.09	-0.08	-0.03	0.02
	(0.08)	(0.14)	(0.06)	(0.10)
Conflict: Material Damage (% GDP)	-0.17	-1.63**	-0.69**	-0.85**
	(0.43)	(0.76)	(0.31)	(0.35)
Conflict: Fatalities per Capita	0.10	0.12	-1.15	-0.97
	(0.90)	(1.57)	(1.02)	(0.84)
Spillover: Conflict in Neighboring Districts	-0.70	0.99	-0.23	0.43
	(0.62)	(1.24)	(0.98)	(0.54)
Time Dummy: Year 2005	0.29	1.48***	0.96***	1.06***
	(0.45)	(0.33)	(0.30)	(0.21)
Time Dummy: Year 2008	0.60	1.55***	1.60***	1.16***
	(0.41)	(0.44)	(0.30)	(0.23)
Constant	2.61	-13.03*	-2.13	-5.01
	(6.11)	(7.83)	(5.71)	(4.83)
Observations	1120	1123	1123	1123
R-squared	0.19	0.11	0.11	0.17
No. of Groups	375	375	375	375
Av. Obs. per Group	2.99	2.99	2.99	2.99

Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Conflict Indices: Fatalities per 1,000 Inhabitants.
Material Damage as 0.01 %-Points of Total District GDP.

Table 5: Regressions Results for Sub-sectors

Dependent Variable: ***GDP Growth***	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Industry				**Services**			
	Mining	*Manufact.*	*Energy*	*Construct.*	*Commerce*	*Transport*	*Finance*	*Services*
Population Growth Rate	0.00	0.08	-0.02	0.14	0.01	0.01	0.04	-0.07
	(0.15)	(0.06)	(0.15)	(0.13)	(0.08)	(0.08)	(0.12)	(0.09)
Availability of Electricity	0.17*	0.08	0.02	0.08	0.07	0.13**	0.29***	0.01
	(0.10)	(0.06)	(0.12)	(0.10)	(0.06)	(0.06)	(0.09)	(0.06)
Av. Education of Village Heads	-0.29	1.44***	0.06	2.25***	0.45	-0.47	-0.40	-0.24
	(1.10)	(0.42)	(0.80)	(0.75)	(0.50)	(0.55)	(1.10)	(0.58)
Ethnic Diversity	0.01	-0.02	-0.06*	0.04	0.01	0.02	-0.01	-0.02
	(0.03)	(0.02)	(0.03)	(0.02)	(0.01)	(0.02)	(0.03)	(0.02)
Natural Disaster Occurred	0.30	-1.81**	0.04	-0.38	-0.69	1.83	0.83	-1.50
	(1.86)	(0.83)	(1.47)	(1.17)	(0.78)	(1.14)	(1.56)	(1.01)
Tsunami: Physical Destruction	-0.98	-2.02***	-1.11***	-1.28	-1.05*	-0.38	0.29	-0.54
	(1.01)	(0.32)	(0.35)	(0.94)	(0.56)	(0.72)	(1.44)	(0.62)
Average Neighboring Growth: Total GDP	-0.23	0.02	0.03	-0.15	-0.07	-0.06	-0.04	0.05
	(0.14)	(0.14)	(0.15)	(0.14)	(0.08)	(0.07)	(0.15)	(0.07)
Conflict: Material Damage (% GDP)	-0.26	-1.46***	0.03	-1.22*	-0.78**	-1.44**	-1.63**	-0.37
	(0.41)	(0.51)	(0.49)	(0.71)	(0.38)	(0.66)	(0.67)	(0.29)
Spillover: Conflict in Neighboring Districts	-0.81	1.35	-1.66	2.13	-1.08	-1.54*	0.88	0.62
	(0.78)	(1.40)	(1.21)	(2.08)	(1.21)	(0.89)	(2.12)	(1.39)
Time Dummy: Year 2005	0.98	1.18***	-1.15*	1.49***	1.58***	-0.19	0.12	0.56
	(0.72)	(0.30)	(0.60)	(0.48)	(0.38)	(0.39)	(0.79)	(0.50)
Time Dummy: Year 2008	0.98	1.69***	-1.14	1.86***	1.77***	0.67	1.85***	1.73***
	(0.79)	(0.44)	(0.71)	(0.61)	(0.43)	(0.48)	(0.67)	(0.50)
Constant	-10.50	-8.45	9.69	-14.22	-3.70	-5.67	-19.10*	7.12
	(11.24)	(6.52)	(11.23)	(10.40)	(6.83)	(7.29)	(9.95)	(6.94)
Observations	1036	1118	1115	1115	1121	1117	1104	1110
R-squared	0.04	0.13	0.02	0.07	0.09	0.10	0.08	0.04
No. of Groups	354	375	375	375	375	375	375	375
Av. Obs. per Group	2.93	2.98	2.97	2.97	2.99	2.98	2.94	2.96

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.
Conflict Index: Material Damage as 0.01 %-Points of Total District GDP.

Table 6: Regression Results – Resolved vs. Ongoing Conflicts

Dep. Var: **GDP Growth**	**(1)** **Agricult.**	**(2)** *Mining*	**(3)** *Manufact.*	**(4)** *Energy*	**(5)** *Construct.*	**(6)** **Industry**	**(7)** *Commerce*	**(8)** *Transport*	**(9)** *Finance*	**(10)** *Services*	**(11)** **Service**	**(12)** **Total**
Population Growth Rate	0.06	-0.00	0.08	-0.02	0.13	0.01	0.01	0.01	0.04	-0.07	-0.05	-0.08
	(0.08)	(0.15)	(0.06)	(0.15)	(0.13)	(0.09)	(0.08)	(0.08)	(0.12)	(0.09)	(0.06)	(0.07)
Availability of Electricity	-0.05	0.17*	0.08	0.02	0.08	0.11	0.07	0.13**	0.29***	0.01	0.08	0.05
	(0.05)	(0.10)	(0.06)	(0.12)	(0.10)	(0.07)	(0.06)	(0.06)	(0.09)	(0.06)	(0.05)	(0.05)
Av. Education of Village Heads	0.85	-0.30	1.44***	0.06	2.21***	1.42**	0.44	-0.49	-0.40	-0.23	-0.07	0.81**
	(0.69)	(1.10)	(0.42)	(0.81)	(0.74)	(0.59)	(0.50)	(0.55)	(1.10)	(0.58)	(0.34)	(0.36)
Ethnic Diversity	0.03*	0.01	-0.02	-0.06*	0.04	0.01	0.01	0.02	-0.01	-0.02	0.00	0.01
	(0.01)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	(0.01)	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)
Natural Disaster Occurred	0.83	0.24	-1.81**	0.03	-0.39	-0.69	-0.69	1.83	0.83	-1.50	-0.21	0.30
	(0.65)	(1.87)	(0.83)	(1.47)	(1.17)	(0.87)	(0.78)	(1.14)	(1.56)	(1.01)	(0.65)	(0.44)
Tsunami: Physical Destruction	-2.94***	-0.98	-2.02***	-1.10***	-1.27	-1.44*	-1.05*	-0.37	0.29	-0.55	-0.60	-1.51***
	(0.58)	(1.00)	(0.32)	(0.34)	(0.94)	(0.75)	(0.56)	(0.72)	(1.44)	(0.62)	(0.48)	(0.47)
Average Neighboring Growth: Total GDP	-0.09	-0.23	0.02	0.04	-0.09	-0.03	-0.06	-0.02	-0.04	0.03	-0.04	0.04
	(0.08)	(0.14)	(0.15)	(0.15)	(0.15)	(0.14)	(0.09)	(0.07)	(0.17)	(0.07)	(0.06)	(0.10)
Resolved Conflict: Material Damage	-0.40	0.36	-1.36	0.17	1.06	0.04	-0.42	0.20	-1.44	-1.01***	-0.68*	0.12
	(0.60)	(0.69)	(0.95)	(1.05)	(0.89)	(0.62)	(0.41)	(0.33)	(0.89)	(0.34)	(0.35)	(0.37)
Ongoing Conflict: Material Damage	0.07	-1.75	-1.58**	-0.13	-3.22***	-3.05***	-1.10	-2.92***	-1.79	0.19	-1.26**	-2.16***
	(0.46)	(1.50)	(0.65)	(0.69)	(0.78)	(0.52)	(0.68)	(0.40)	(1.44)	(0.34)	(0.59)	(0.33)
Spillover: Conflict in Neighboring Districts	-0.75	-0.55	1.38	-1.62	2.67	1.39	-1.00	-1.15	0.93	0.48	-0.23	0.65
	(0.64)	(0.93)	(1.46)	(1.26)	(2.14)	(1.29)	(1.23)	(0.92)	(2.16)	(1.35)	(0.97)	(0.55)
Time Dummy: Year 2005	0.28	1.01	1.19***	-1.15*	1.58***	1.55***	1.60***	-0.12	0.13	0.53	0.98***	1.12***
	(0.45)	(0.73)	(0.30)	(0.60)	(0.48)	(0.33)	(0.38)	(0.39)	(0.79)	(0.49)	(0.29)	(0.21)
Time Dummy: Year 2008	0.59	1.02	1.69***	-1.14	1.94***	1.61***	1.78***	0.72	1.85***	1.71***	1.61***	1.20***
	(0.41)	(0.80)	(0.44)	(0.71)	(0.60)	(0.44)	(0.42)	(0.48)	(0.67)	(0.50)	(0.29)	(0.23)
Constant	2.67	-10.40	-8.46	9.65	-14.58	-13.35*	-3.77	-5.97	-19.14*	7.25	-2.29	-5.34
	(6.10)	(11.23)	(6.55)	(11.20)	(10.41)	(7.80)	(6.84)	(7.31)	(9.97)	(6.93)	(5.72)	(4.82)
Observations	1120	1036	1118	1115	1115	1123	1121	1117	1104	1110	1123	1123
R-squared	0.19	0.04	0.13	0.02	0.08	0.11	0.09	0.10	0.08	0.04	0.11	0.17
No. of Groups	375	354	375	375	375	375	375	375	375	375	375	375
Av. Obs. per Group	2.99	2.93	2.98	2.97	2.97	2.99	2.99	2.98	2.94	2.96	2.99	2.99

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.
Conflict Index: Material Damage as 0.01 %-Points of Total District GDP.

Table 7: Robustness Tests

Dep. Var: **GDP Growth**	(1) **Agricult.**	(2) *Mining*	(3) *Manufact.*	(4) *Energy*	(5) *Construct.*	(6) **Industry**	(7) *Commerce*	(8) *Transport*	(9) *Finance*	(10) *Services*	(11) **Service**	(12) **Total**
SPATIAL SUB-SAMPLES												
a. Rural Areas												
Resolved Conflict: Material Damage	-0.41	0.51	-1.54	0.33	1.25	0.05	-0.42	0.46	-1.30	-1.29***	-0.70*	-0.07
	(0.50)	(0.78)	(1.04)	(1.18)	(0.84)	(0.51)	(0.46)	(0.36)	(0.81)	(0.40)	(0.40)	(0.29)
Ongoing Conflict: Material Damage	-0.06	-1.84	-1.28**	-0.22	-2.89***	-2.73***	-1.15	-3.20***	-1.86*	0.52	-1.25**	-1.95***
	(0.49)	(1.76)	(0.61)	(0.82)	(0.71)	(0.48)	(0.71)	(0.40)	(1.04)	(0.49)	(0.62)	(0.32)
Spillover: Conflict in Neighboring Districts	-0.92	-0.37	2.17	-2.43	3.61	1.78	-1.72	-2.16**	-2.10*	1.66	-0.35	0.50
	(0.85)	(1.12)	(1.83)	(1.57)	(2.92)	(1.71)	(1.79)	(0.99)	(1.12)	(1.85)	(1.45)	(0.72)
b. Exclusion of NAD												
Resolved Conflict: Material Damage	0.43	0.96	-0.80	1.10	2.67*	0.56	-0.12	0.23	-2.33***	-0.31	-0.43	0.20
	(0.90)	(0.88)	(1.04)	(1.19)	(1.54)	(0.86)	(0.55)	(0.62)	(0.89)	(0.56)	(0.44)	(0.62)
Ongoing Conflict: Material Damage	-3.22	-4.03*	-2.80	-5.24**	-8.03**	-4.45**	-1.68	-3.15	2.34	-1.46	-1.36	-2.35
	(2.34)	(2.30)	(2.77)	(2.63)	(3.33)	(2.14)	(1.18)	(2.16)	(1.98)	(1.57)	(1.35)	(1.63)
Spillover: Conflict in Neighboring Districts	-0.59	-1.84	-0.53	0.42	-0.67	-1.03	-1.74*	-1.42*	-1.95*	-1.34*	-1.68**	-0.59
	(0.91)	(1.28)	(0.88)	(1.22)	(0.85)	(0.82)	(1.02)	(0.75)	(1.07)	(0.73)	(0.81)	(0.62)
c. Exclusion of Sulawesi and the Moluccas												
Resolved Conflict: Material Damage	-0.06	0.47	-3.77***	4.39**	4.39***	0.05	-1.23	-1.22	-3.23	-1.84*	-1.96**	-0.56
	(0.64)	(1.58)	(1.45)	(2.18)	(1.65)	(1.03)	(1.15)	(0.99)	(2.60)	(1.05)	(0.99)	(0.59)
Ongoing Conflict: Material Damage	0.18	-3.10	-2.06**	0.43	-4.06***	-3.84***	-1.58**	-3.14***	-3.08***	-0.27	-1.80***	-2.80***
	(0.37)	(2.94)	(0.96)	(0.77)	(0.99)	(0.70)	(0.74)	(0.36)	(1.16)	(0.35)	(0.52)	(0.33)
Spillover: Conflict in Neighboring Districts	-1.00	1.19	2.93	-3.44	5.42	3.79*	-0.04	-0.68	4.29	1.75	1.08	2.15***
	(0.87)	(1.67)	(2.39)	(2.29)	(3.32)	(1.96)	(2.07)	(1.45)	(2.66)	(2.47)	(1.65)	(0.73)
ALTERNATIVE CONFLICT INDICATORS												
c. Fatalities per Capita												
Resolved Conflict: Fatalities	-1.88*	-3.48	0.14	8.09	0.40	1.62	-1.28	0.90	1.26	-2.11	-0.96	0.30
	(1.01)	(2.31)	(1.40)	(7.36)	(1.70)	(1.24)	(1.29)	(1.20)	(2.62)	(1.31)	(0.95)	(0.95)
Ongoing Conflict: Fatalities	0.93	2.61	-2.97**	-4.76	-4.20*	-6.23***	-2.25	-4.91**	-7.88***	-0.12	-3.17**	-4.53***
	(0.78)	(3.04)	(1.19)	(4.51)	(2.25)	(1.55)	(1.79)	(2.33)	(1.57)	(1.43)	(1.58)	(1.35)
Spillover: Conflict in Neighboring Districts	-0.63	0.40	1.82	2.06	3.84	3.13	-3.37*	-2.66*	1.55	1.50	-0.82	1.10
	(1.21)	(1.70)	(3.09)	(6.07)	(3.97)	(2.47)	(1.89)	(1.38)	(3.58)	(2.40)	(1.64)	(1.27)
e. Share of Villages Affected by Conflict												
Resolved Conflict: Fatalities	0.57	0.69	0.30	0.86	0.58	0.54	-0.02	-0.24	-0.17	-0.17	-0.15	0.34
	(0.47)	(0.82)	(0.51)	(0.80)	(0.63)	(0.49)	(0.35)	(0.41)	(0.61)	(0.47)	(0.26)	(0.31)
Ongoing Conflict: Fatalities	0.31	-0.54	0.28	-1.55	0.61	-0.55	-1.48	-1.45	-2.30	0.11	-0.98	-0.51
	(0.35)	(0.84)	(1.31)	(1.30)	(2.12)	(1.45)	(0.94)	(1.15)	(1.62)	(0.82)	(0.87)	(0.91)
Spillover: Conflict in Neighboring Districts	0.08	0.72	0.38	-0.18	0.54	0.93**	0.12	0.16	0.29	-0.28	-0.05	0.49
	(0.31)	(0.57)	(0.50)	(0.56)	(0.46)	(0.47)	(0.32)	(0.42)	(0.64)	(0.47)	(0.30)	(0.31)
f. Material Damage – Absolute Values												
Resolved Conflict: Material Damage	-0.48	0.40	0.37	0.37	1.02	0.69	-0.29	-0.23	-1.64***	-1.18***	-0.66**	0.08
	(0.48)	(1.26)	(1.06)	(0.81)	(1.04)	(0.80)	(0.32)	(0.39)	(0.54)	(0.37)	(0.25)	(0.56)
Ongoing Conflict: Material Damage	0.19	-3.33	-0.65***	-0.04	-1.29***	-1.44***	-0.80***	-1.50***	-1.34***	0.16	-0.80***	-1.09***
	(0.13)	(2.57)	(0.22)	(0.24)	(0.22)	(0.21)	(0.13)	(0.12)	(0.33)	(0.12)	(0.11)	(0.15)
Spillover: Conflict in Neighboring Districts	-0.50	0.70	1.01	-1.00	1.80	1.15	-0.38	-0.50	0.99	0.29	-0.00	0.52
	(0.33)	(0.76)	(0.95)	(0.79)	(1.36)	(0.84)	(0.74)	(0.54)	(1.20)	(0.87)	(0.58)	(0.34)
g. Fatalities – Absolute Numbers												
Resolved Conflict: Fatalities	-0.37	-0.84**	0.31	2.61**	0.04	0.52***	-0.39**	0.26	0.46	-0.27	-0.21	0.06
	(0.23)	(0.40)	(0.21)	(1.08)	(0.37)	(0.20)	(0.18)	(0.16)	(0.44)	(0.25)	(0.16)	(0.16)
Ongoing Conflict: Fatalities	0.23	0.14	-0.86***	-1.36	-1.24*	-1.95***	-1.00***	-1.86***	-2.37***	-0.14	-1.21***	-1.50***
	(0.22)	(1.31)	(0.29)	(1.21)	(0.64)	(0.38)	(0.35)	(0.43)	(0.37)	(0.39)	(0.26)	(0.29)
Spillover: Conflict in Neighboring Districts	-0.24	0.30	0.23	1.23	0.73	0.67	-0.82**	-0.61*	0.33	0.26	-0.28	0.16
	(0.22)	(0.33)	(0.74)	(1.52)	(1.00)	(0.59)	(0.39)	(0.32)	(0.85)	(0.50)	(0.34)	(0.33)

Each pair of coefficients from a different regression (control variables as in Table 5).
Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.
Conflict Indices: a) relative: Fatalities per 1,000 Inhabitants. Material Damage as 0.01 %-Points of Total District GDP.
b) absolute: Number of Fatalities (in 100 deaths). Material Damage (in 1 billion Rupiah).

APPENDIX

Table I: Structure of the GDP Data

	Sub-Sector	Sub-Branches	GDP Share 2000 *(Rural Areas)*	GDP Share 2008 *(Rural Areas)*
AGRICULTURE	*Agriculture*	Farm Food Crops Estate Crops Livestock Forestry Fishery	16.7† *(27.5)*	15.5 *(26.2)*
INDUSTRY	*Mining*	Mining (Oil) Mining (Others) Quarrying	11.1 *(18.8)*	8.5 *(14.8)*
	Manufacturing	Oil & Gas Manufacturing - Petroleum Refinery - Liquefied Natural Gas Non Oil & Gas Manufacturing - Food, Beverage & Tobacco - Textile, Leather Products & Footwear - Wood Products & Forest Products - Paper - Fertilizer, Chemicals & Rubber Products - Cements and Non-metal Quarrying Products - Iron & Steel - Transport. Vehicle, Machinery & Equipment - Other Manufactured Products	26.3 *(21.7)*	24.3 *(22.2)*
	Energy	Electricity Gas Water Supply	1.0 *(0.9)*	1.1 *(1.0)*
	Construction	Construction Total	5.1 *(3.3)*	5.9 *(3.9)*
SERVICES	*Commerce*	Large Trade & Retail Hotel Restaurant	17.5 *(14.5)*	20.0 *(16.5)*
	Transport & Communication	Transportation - Railway Transport - Road Transport - Sea Water Transport - Inland Water Transport - Air Transport - Transportation Supporting Communication - Post and Telecommunication - Communication Supporting	5.2 *(3.4)*	6.9 *(4.0)*
	Finance	Banking Non-banking Financial Institution Financial Supporting Rent of Building Business Services	8.6 *(2.7)*	8.8 *(3.1)*
	Services	General Government - Government Administration & Defense - Other Government Services Private - Social Community - Recreation & Entertainment - Household & Private	8.5 *(7.2)*	9.0 *(8.2)*

† Percentage share of total (*rural*) GDP.

Table II: Unchanged GDP Data

Dep. Var: **GDP Growth**	**(1)** ***Agricult.***	**(2)** *Mining*	**(3)** *Manufact.*	**(4)** *Energy*	**(5)** *Construct.*	**(6)** ***Industry***	**(7)** *Commerce*	**(8)** *Transport*	**(9)** *Finance*	**(10)** *Services*	**(11)** ***Service***	**(12)** ***Total***
a. All Areas												
Resolved Conflict: Material Damage	-0.74	-6.92	-1.54	0.02	0.27	-1.25	-0.35	0.10	0.20	-2.66	-1.11	0.10
	(0.57)	(5.76)	(1.00)	(1.14)	(1.06)	(1.65)	(0.42)	(0.42)	(1.86)	(3.52)	(1.36)	(0.68)
Ongoing Conflict: Material Damage	0.23	7.82	-1.60**	0.21	-2.10**	-2.07	-1.09	-2.45***	-0.23	-0.96	-1.62**	-3.79***
	(0.55)	(5.48)	(0.67)	(0.83)	(0.90)	(2.05)	(0.66)	(0.58)	(3.52)	(2.80)	(0.79)	(1.19)
Spillover: Conflict in Neighboring Districts	-0.91	-16.04	1.28	-2.11	-0.04	0.27	-1.05	-0.18	-10.51	-4.16	-1.05	2.47
	(0.90)	(16.33)	(1.46)	(1.78)	(2.52)	(4.85)	(1.21)	(0.94)	(11.07)	(5.11)	(1.76)	(3.28)
b. Rural Areas												
Resolved Conflict: Material Damage	-0.90*	-7.07	-1.81*	0.06	0.50	-1.61	-0.37	0.20	2.82	-2.48	-1.02	-0.33
	(0.49)	(5.82)	(1.10)	(1.22)	(1.04)	(2.10)	(0.47)	(0.47)	(2.76)	(3.75)	(1.43)	(0.82)
Ongoing Conflict: Material Damage	0.10	7.95	-1.29*	0.29	-1.99**	-1.35	-1.13	-2.55***	-3.00	-1.30	-1.73**	-3.31***
	(0.58)	(5.19)	(0.67)	(0.95)	(0.90)	(2.44)	(0.70)	(0.58)	(2.21)	(3.06)	(0.88)	(1.16)
Spillover: Conflict in Neighboring Districts	-1.32	-19.51	2.00	-3.38	0.13	1.07	-1.77	-0.38	-18.10	-6.99	-1.99	3.10
	(1.16)	(22.69)	(1.85)	(2.38)	(3.54)	(6.88)	(1.77)	(1.34)	(14.31)	(7.19)	(2.57)	(4.56)
c. Fatalities per Capita												
Resolved Conflict: Fatalities	-1.33	-1.21	-0.30	8.23	1.23	2.82*	-1.00	1.68	3.35	-4.06	-1.60	1.68
	(1.19)	(2.39)	(1.61)	(7.24)	(1.49)	(1.68)	(1.29)	(1.30)	(3.50)	(4.62)	(1.53)	(1.52)
Ongoing Conflict: Fatalities	1.30	14.10**	-2.09	-2.96	-3.67*	-2.05	-3.08**	-4.78**	-11.19*	-0.80	-3.40*	-6.32***
	(0.94)	(6.40)	(1.63)	(4.29)	(2.18)	(2.40)	(1.53)	(2.23)	(5.98)	(6.85)	(1.91)	(1.62)
Spillover: Conflict in Neighboring Districts	-1.02	-11.87	0.80	-0.14	0.60	2.10	-3.30*	-1.13	-15.21	-28.39*	-7.55*	2.13
	(1.58)	(16.32)	(3.04)	(7.29)	(4.23)	(7.98)	(1.96)	(1.35)	(19.19)	(16.72)	(4.23)	(5.87)

Each pair of coefficients from a different regression (control variables as in Table 5).
Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.
Conflict Indices: Fatalities per 1,000 Inhabitants. Material Damage as 0.01 %-Points of Total District GDP.